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**IS 15421 (Part 1) : 2003**
**ISO 13565-1 : 1996**

*भारतीय मानक*

# ज्यामितीय उत्पाद विशिष्टि (जी.पी.एस.) — पृष्ठ गठन : प्रोफाइल पद्धति — स्ट्रैटीफाइड प्रकार्यात्मक गुणधर्मों वाली सतहें

## भाग 1 फिल्टरन और सामान्य मापन स्थितियां

*Indian Standard*

# GEOMETRICAL PRODUCT SPECIFICATIONS (GPS) — SURFACE TEXTURE : PROFILE METHOD — SURFACES HAVING STRATIFIED FUNCTIONAL PROPERTIES

## PART 1 FILTERING AND GENERAL MEASUREMENT CONDITIONS

ICS 17.040.20

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NEW DELHI 110002

*December* 2003

**Price Group 3**

Engineering Metrology Sectional Committee, BP 25

## NATIONAL FOREWORD

This Indian Standard (Part 1) which is identical with ISO 13565-1 : 1996 'Geometrical Product Specifications (GPS) — Surface texture:Profile method; Surfaces having stratified functional properties — Part 1 : Filtering and general measurement conditions' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendations of the Engineering Metrology Sectional Committee and approval of the Basic and Production Engineering Division Council.

This standard describes a filtering method for use with surfaces that have deep valleys below a more finally finished plateau with a relatively small amount of waviness. The reference resulting from filtering for such surfaces is undesirably influenced by the presence of the valleys. The filtering approach described in this standard suppresses the valley influence on the reference line such that a more satisfactory reference line is generated.

The text of the ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. In this adopted standard certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker in the International Standards while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

Technical Corrigendum 1 to the above International Standard has been incorporated.

This standard (Part 1) covers the filtering and general measurement conditions. The other parts of this standard are:

| *IS No.* | *Title* |
|---|---|
| IS 15421 (Part 2) : 2003<br>ISO 13565-2 : 1996 | Geometrical Product Specifications (GPS) — Surface texture: Profile method — Surfaces having stratified functional properties: Part 2 Height characterization using the linear material ratio curve |
| IS 15421 (Part 3) : 2003<br>ISO 13565-3 : 1998 | Geometrical Product Specifications (GPS) — Surface texture: Profile method — Surfaces having stratified functional properties: Part 3 Height characterization using the material probability curve |

In this adopted standard, reference appears to the following International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their place are listed below along with their degree of equivalence for the editions indicated:

| *International Standard* | *Corresponding Indian Standard* | *Degree of Equivalence* |
|---|---|---|
| ISO 3274 : 1996 Geometrical Product Specifications (GPS) — Surface texture : Profile method — Nominal characteristics of contact (stylus) instruments | IS 15261 : 2002 Geometrical Product Specifications (GPS) — Surface texture : Profile method — Nominal characteristics of contact (stylus) instruments | Identical |

(*Continued on third cover*)

*Indian Standard*

# GEOMETRICAL PRODUCT SPECIFICATIONS (GPS) — SURFACE TEXTURE : PROFILE METHOD — SURFACES HAVING STRATIFIED FUNCTIONAL PROPERTIES

## PART 1 FILTERING AND GENERAL MEASUREMENT CONDITIONS

## 1 Scope

This part of ISO 13565 describes a filtering method for use with surfaces that have deep valleys below a more finely finished plateau with a relatively small amount of waviness. The reference line resulting from filtering according to ISO 11562 for such surfaces is undesirably influenced by the presence of the valleys. The filtering approach described in this standard suppresses the valley influence on the reference line such that a more satisfactory reference line is generated.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 13565. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 13565 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3274:1996, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Nominal characteristics of contact (stylus) instruments.*

ISO 4287:1997, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters.*

ISO 11562:1996, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Metrological characteristics of phase correct filters.*

## 3 Definitions

For the purposes of this part of ISO 13565, the definitions given in ISO 3274 and ISO 4287 apply.

## 4 Reference guide

To measure profiles in accordance with this part of ISO 13565, a measuring system which incorporates an external reference is recommended. In case of arbitration the use of such a system is obligatory.

## 5 Traversing direction

The traversing direction shall be perpendicular to the direction of lay unless otherwise indicated.

## 6 Filtering process to determine the roughness profile

The filtering process is carried out in several stages giving the modified profiles, sections of which are illustrated in figure 1a) to d).

The first mean line is determined by a preliminary filtering of the primary profile with the phase correct filter in accordance with ISO 11562 using a cut-off wavelength $\lambda c$ in accordance with clause 7 and corresponding measuring conditions in accordance with table 1 of ISO 3274:1996. All valley portions which lie below this mean line (shown hatched in figure 1a) are removed. In these places the primary profile is replaced by the curve of the mean line.

The same filter is used again on this profile with the valleys suppressed. The second mean line thus obtained (see figure 1b) is the reference line relative to which the assessment of profile parameters is performed. This reference line is tranferred to the original primary profile (see figure 1c) and the roughness profile according to this part of ISO 13565 is obtained from the difference between the primary profile and the reference line (see figure 1d).

## 7 Selection of the cut-off wavelength $\lambda c$ and the evaluation length $ln$

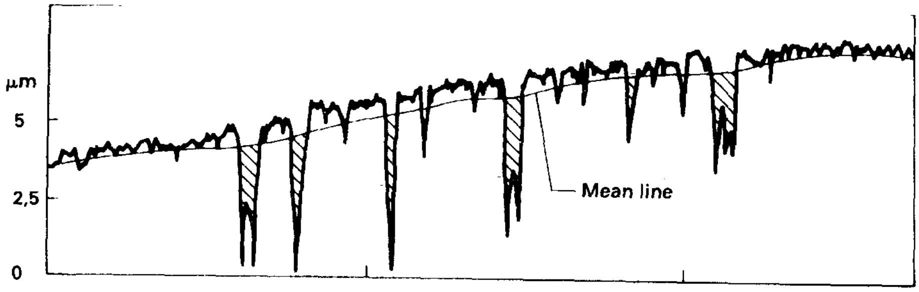
The measurements shall preferably be carried out using a cut-off wavelength of $\lambda c$ = 0,8 mm. In justified exceptional cases, $\lambda c$ = 2,5 mm may be selected and this shall be stated in the specification and test results.

Table 1 provides the relationship between cut-off wavelength $\lambda c$ and the evaluation length $ln$

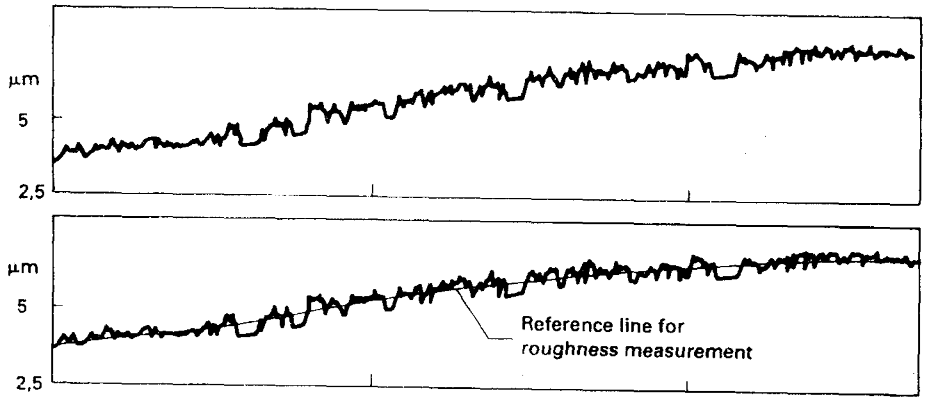
**Table 1 — Relationship between the cut-off wavelength $\lambda c$ and the evaluation length $ln$**

Dimensions in millimetres

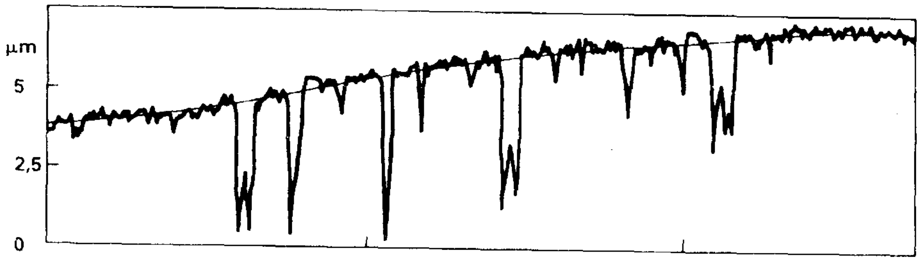
| $\lambda c$ | $ln$ |
|---|---|
| 0,8 | 4 |
| 2,5 | 12,5 |



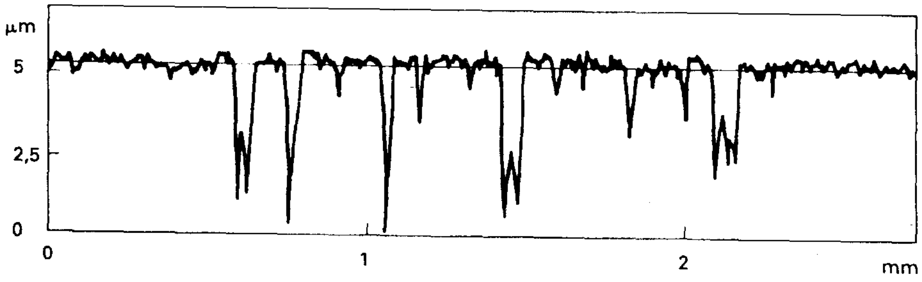
a) Unfiltered primary profile (valleys shown hatched)



b) Unfiltered primary profile after suppression of valleys



c) Position of the reference line in the primary profile



d) Roughness profile in accordance with this standard

Figure 1 — Filtering process

# Annex A
(informative)

## Relation to GPS matrix model

For full details about the GPS matrix model see ISO/TR 14638.

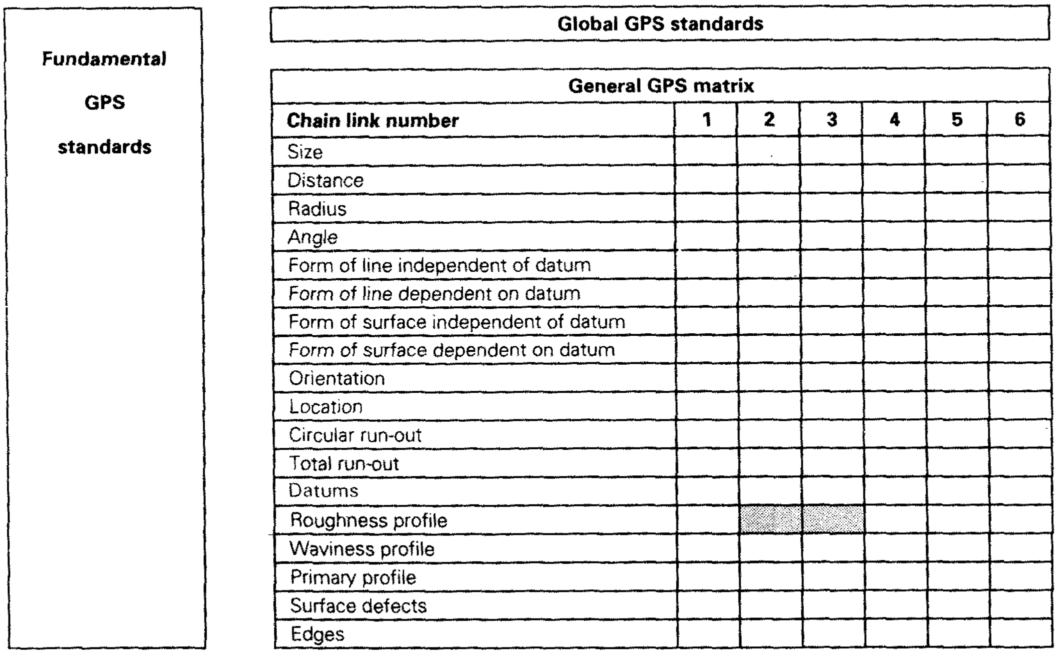
### A.1 Information about this part of ISO 13565 and its use

This part of ISO 13565 describes a filtering method for use with surfaces that have deep valleys below a more finely finished plateau with a relatively small amount of waviness. The roughness profile generated using the filter defined in ISO 11562 suffers some undesirable distortions, when measuring this type of surface, which is very common.

This method serves to reduce these distortions, thus enabling the parameters defined in ISO 13565-2 and ISO 13565-3 to be used for evaluating the above-mentioned type of surface, with minimal influence from these distortions.

### A.2 Position in the GPS matrix model

This part of ISO 13565 is a *General GPS standard*, which influences the chain links 2 and 3 of the chain of standards for roughness profile in the *General GPS matrix*, as graphically illustrated in figure A.1.



**Fundamental GPS standards**

**Global GPS standards**

**General GPS matrix**

| **Chain link number** | **1** | **2** | **3** | **4** | **5** | **6** |
|---|---|---|---|---|---|---|
| Size | | | | | | |
| Distance | | | | | | |
| Radius | | | | | | |
| Angle | | | | | | |
| Form of line independent of datum | | | | | | |
| Form of line dependent on datum | | | | | | |
| Form of surface independent of datum | | | | | | |
| Form of surface dependent on datum | | | | | | |
| Orientation | | | | | | |
| Location | | | | | | |
| Circular run-out | | | | | | |
| Total run-out | | | | | | |
| Datums | | | | | | |
| Roughness profile | | ▨ | ▨ | | | |
| Waviness profile | | | | | | |
| Primary profile | | | | | | |
| Surface defects | | | | | | |
| Edges | | | | | | |

**Figure A.1**

### A.3 Related standards

The related International Standards are those of the chains of standards indicated in figure A.1.

# Annex B
(informative)

## Bibliography

[1] ISO 13565-2:1996, *Geometrical Product Specifications (GPS) — Surface texture: Profile method; Surfaces having stratified functional properties — Part 2: Height characterization using the linear material ratio curve.*

[2] ISO 13565-3:—[1], *Geometrical Product Specifications (GPS) — Surface texture: Profile method; Surfaces having stratified functional properties — Part 3: Height characterization using the material probability curve.*

[3] ISO/TR 14638:1995, *Geometrical Product Specifications (GPS) — Masterplan.*

[4] *VIM — International vocabulary of basic and general terms in metrology.* BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML, 2nd edition, 1993.

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1) To be published.

*(Continued from second cover)*

| *International Standard* | *Corresponding Indian Standard* | *Degree of Equivalence* |
|---|---|---|
| ISO 4287 : 1997 Geometrical Product Specifications (GPS) — Surface texture : Profile method — Terms, definitions and surface texture parameters | IS 15262 : 2002 Geometrical Product Specifications (GPS) — Surface texture : Profile method — Terms, definitions and surface texture parameters | Identical |
| ISO 11562 : 1996 Geometrical Product Specifications (GPS) — Surface texture: Profile method — Metrological characteristics of phase correct filters | IS 15375 : 2003 Geometrical Product Specifications (GPS) — Surface texture: Profile method — Metrological characteristics of phase correct filters | do |

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